

## Multi-function X-band Programmable Transceiver & Beacon Detector

### Transceiver Key Features

- ◆ X-band RF transceiver with 1 Transmit channel, 2 receive channels and 1 beacon receive channel with digital detector
- ◆ Digitally tuned RF frequencies and power level supported
  - Transmit 7900-8400 MHz; -2 to -22 dBm RF output
  - Receive 7250-7750 MHz; -117 to -85 dBm RF input
- ◆ No spectrum inversion in transmit or receive channels
- ◆ Onboard 25 MHz OCXO with  $\pm 2$  ppb per day stability
- ◆ Back-end modem interface options include external L-band modem or external digital LVDS interface modem
  - L-band transmit 950-1450 MHz at -5 to -25 dBm input
  - L-band receive 1445 MHz at -46 dBm to -14 dBm output
  - Digital LVDS modem interface specification provided upon request under separate agreement
- ◆ Beacon input receive -114 to -117 dBm nominal
- ◆ Noise figure
  - Total Transmit 10 dB
  - Total Receive 2.78 dB
- ◆ Mechanical (2 board RF/digital assembly)
  - 8.625" (220mm) x 8.625" (220mm) x 1.875" (48mm) H
- ◆ OEM Version connector interfaces
  - 50 $\Omega$  SMP Jack for all RF and L-band inputs and outputs
  - RJ45 for Ethernet for monitor and control
  - RS 232C for serial console (for maintenance use only)
- ◆ 1U Chassis or Tactical chassis Option
  - N-type female for RF and L-band, (SMA special option)
- ◆ OEM version requires
  - 4VDC @5A, 6VDC @4A, -5VDC @ 0.5A, 15VDC @ 2A
  - 25 Watts power consumption maximum
  - Optional single voltage 28 VDC or 48 VDC input separate power supply assembly available which provides the above voltages with the required currents for the transceiver. Power supply dimensions: 8"(204mm) x 4" (102mm) x 1" (25 mm)
- ◆ Environmental
  - Designed to support MIL-STD-810G with appropriate packaging



Alico Systems has developed a unique multi-functional transceiver that provides up/down conversion, digital beacon detector and back end interface options that include either a L-band IF interface or a digital interface based on LVDS. The transceiver is based on a 2 board printed circuit board assembly show above which includes the blue color RF module and green color digital controller. RF module is shielded on the top and bottom.

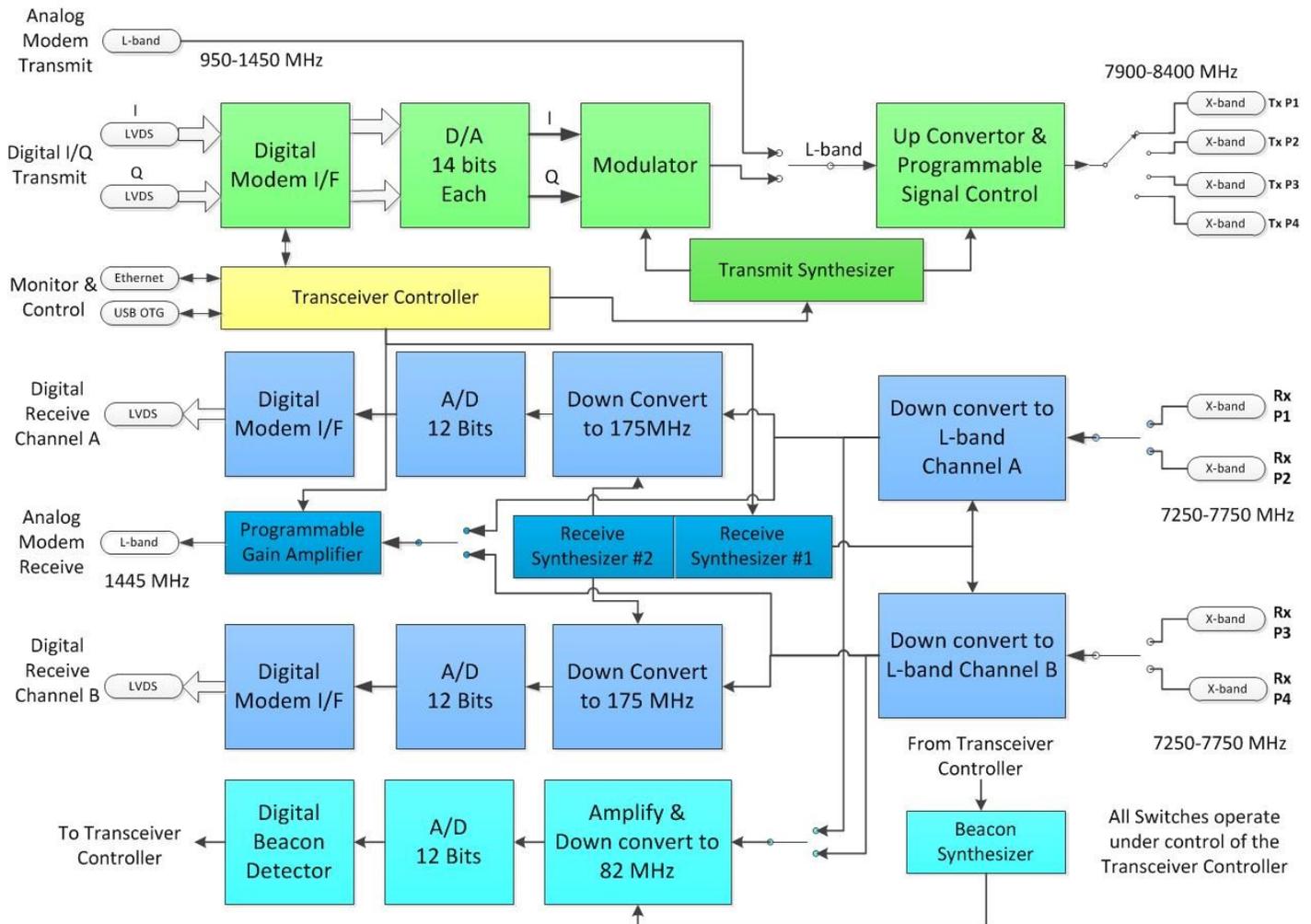


MODEM	Select Modem	External Internal		Set	Cancel
RF FREQUENCY RANGE	Beacon Offset	0 (-100000 - 100000) Hz	0 (Hz)	Set	Cancel
	Receive	7500.000000 (7250 - 7750) MHz	7500.000000 (MHz)	Set	Cancel
	Transmit	8200.000000 (7900 - 8400) MHz	8200.000000 (MHz)	Set	Cancel
RX GAIN CONTROL	Rx Beacon	10 (0 - 40) dB	10 (dB)	Set	Cancel
	Rx A	20 (0 - 40) dB	20 (dB)	Set	Cancel
	Rx B	12 (0 - 40) dB	12 (dB)	Set	Cancel
TX GAIN CONTROL	Transmit Gain	18 (0 - 30) dB	18 (dB)	Set	Cancel

STATUS: 2 Err! 1 Warn! Antenna 3 Offline | GPS Offline | Antenna 2 Temp High  
Rx Beacon was set to 10 dB

Ethernet based Monitor and control interface provided by a standard browser. Transceiver includes a HTTP web server which supports provisioning and transceiver management including data logging and configuration save and reload capability. On board flash stores configuration when powered off.

## Transceiver Functional Block Diagram



The Alico RF transceiver comprises of a single super-heterodyne transmitter, dual super-heterodyne receiver channels and a Beacon receiver. Figure above illustrates the RF Transceiver functional block diagram

The main functional blocks of the transmitter are: the transmit Baseband which includes the digital modem interface and D/A convertor, the transmit Intermediate Frequency comprises of the I/Q modulator, the transmit Radio Frequency (TX RF) and a single synthesized local oscillator (LO) that generates the LO for both the TX IF and TX RF. The transmitter/up-convertor can also accept an L-band signal with -17dBm nominally at the TX IF input, up-converting it to X-band signal and adjust its power level to -6dBm constantly by the TX RF block.

The receivers on the other hand are composed of the receive Baseband (RX BB), the receive Intermediate Frequency (RX IF) and the receive Radio Frequency (RX RF) for each of the main receive chain, a shared RX IF LO, a shared RX RF LO and

a separate Beacon receiver with its own Beacon LO. Each main receiver is designed to receive X-band signals with power level at -91dBm nominally and as low as -117dBm CW Beacon signal at the RX RF input, down-converting it to L-band IF with nominal power level of -29.5dBm before going out to the external modem with either combined or none-combined signals. The down-converted L-band Beacon signal is then further down-converted to the 2nd Beacon IF signal with power level of -20dBm before entering the digital board to be processed.

The Transceiver Digital Control unit controls the RF transceiver to change transmit, receive and beacon signal frequencies and transmit and receive signal levels. It is able to select the intermediate frequency A/D and D/A. It is able to detect the presence of a beacon signal and provide a signal strength value to the beacon tracking system. This signal can be available externally via Ethernet or the USB ports.

## Transceiver Phase Noise

Module # 1						
	Modulator LO (Tx IF)			Up-Converter LO		
	Low Band 1580 MHz	Mid Band 1630 MHz	High Band 1680 MHz	Low Band 6320 MHz	Mid Band 6520 MHz	High Band 6720 MHz
Frequency Offset	Density (dBc/Hz)			Density (dBc/Hz)		
10 Hz	-69.6	-59.1	-57.3	-57.4	-48.4	-43.7
100 Hz	-81.5	-81.0	-80.6	-68.1	-70.3	-68.6
1 KHz	-96.1	-95.4	-95.5	-84.0	-83.2	-83.0
10 KHz	-102.0	-102.2	-98.4	-93.4	-92.2	-89.3
100 KHz	-112.9	-117.2	-118.7	-100.3	-106.0	-107.3
1 MHz	-144.0	-144.1	-144.5	-135.3	-136.0	-136.0
10 MHz	-149.6	-149.6	-149.4	-154.0	-151.5	148.3
100MHz	-151.6	-151.0	-151.7	-155.0	-152.0	-151.4
Power Level (dBm)	4.5	4.0	3.8	14.1	14.0	13.0

Module # 1							
	Demodulator LO	Down-Converter LO			Beacon PLL		
	Frequency 1300 MHz	Low Band 5775 MHz	Mid Band 6025 MHz	High Band 6275 MHz	Low Band 1100 MHz	Mid Band 1500 MHz	High Band 2000 MHz
Frequency Offset	Density (dBc/Hz)						
10 Hz	-64.8	-47.8	-47.6	-45.0	-63.0	-63.0	-64.4
100 Hz	-83.7	-71.0	-69.0	-70.0	-81.3	-79.0	-73.0
1 KHz	-95.8	-84.3	-83.8	-85.0	-97.3	-95.0	-92.0
10 KHz	-96.5	-91.0	-90.0	-91.5	-105.0	-96.0	-96.8
100 KHz	-105.2	-101.0	-104.6	-108.8	-110.4	-108.7	-106.8
1 MHz	-139.4	-136.0	-137.5	-138.5	-136.6	-141.1	-136.0
10 MHz	-150.1	-153.8	-154.3	-154.6	-151.5	-150.3	-149.4
100MHz	-151.0	-156.6	-157.0	-156.0	151.6	-150.5	-147.8
Power Level (dBm)	3.2	12.5	13.4	13.4	16.2	15.2	13.5



# X-band Synthesized RF Transceiver Model XST-7500

## Transceiver Linearity

Input Power Level (dBm)		IM3(dBc)			Output Power (dBm)		
SCL	Composite	7.9GHz	8.15GHz	8.4GHz	7.9GHz	8.15GHz	8.4GHz
-28	-25.0	70.0	70.7	69.0	-9.9	-10.1	-10.0
-26	-23.0	68.0	67.1	66.4	-8.0	-8.2	-7.9
-24	-21.0	63.8	64.0	62.7	-6.0	-6.4	-6.0
-22	-19.0	59.8	60.0	58.8	-4.0	-4.4	-4.0
-20	-17.0	58.0	57.6	55.8	-2.1	-2.4	-2.0
-18	-15.0	54.3	53.7	52.5	0.0	-0.7	0.0
-16	-13.0	50.5	50.3	50.0	2.0	1.3	2.0
-14	-11.0	47.0	47.5	46.5	4.0	3.2	4.0
-12	-9.0	42.0	42.8	43.2	5.8	5.1	6.0
-10	-7.0	35.8	37.6	37.3	7.0	7.0	8.0
-8	-5.0	30.0	31.3	29.4	9.3	8.8	10.0
-6	-3.0	24.0	25.6	22.4	11.2	10.3	11.1
-4	-1.0	19.7	20.8	17.4	12.0	11.3	12.1
-2	1.0	16.4	17.7	14.4	12.5	12.1	12.5
0	3.0	14.0	14.4	12.2	12.9	12.6	12.8

Options			
Power Supply	Single 28 VDC Power Option	Single 48 VDC Power Option	115-240 VAC Option (Rack mount only)
Chassis	OEM Version Embeddable Module	Tactical enclosure	1U Rack Mount Version

Specifications subject to change without notice:

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